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ABSTRACT

Education is not a respected profession because educational practice is not based on a solid body of scientific research and theory. Education is at a prescientific or early scientific stage of development. Attempts by educators to base their practice on behavioral science fail because behaviorism encompasses only a narrow segment of human learning. Counterexamples to behaviorism are abundant. Certainly, if children are to be taught to stay off the street or to memorize the multiplication tables, the behavioral perspective is appropriate. But, within the broader perspective of children's acquisition of knowledge and moral values, behaviorism is inadequate. Piaget studied these issues and concluded that rather than being learned directly by internalization, both knowledge and morality are constructed by children in interaction with their environment. Critical issues and implications are associated with the behaviorist/constructivist controversy. Behaviorism may tend to produce children who are oriented toward being governed by somebody else, whereas the constructivist approach may encourage children to become self-governing. Piaget recognized that education is and must remain an art--but also must become an art based on a vast amount of scientific knowledge. The tools needed to produce that knowledge are the contribution of Jean Piaget. (Author/RH)

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THE SCIENTIFIC FOUNDATION OF EDUCATION

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Piaget's theory is so original and has so many aspects that it has influenced many people in a wide variety of fields, such as logic, physics, ethology, psycholinguistics, cybernetics, and education, to name only a few. As an educator who has been profoundly influenced by him, I would like to focus this evening on an important point he made about education, and discuss the recent "back to the basics" movement as an example of this point.

Piaget (1965) said that education is not a profession that is respected in our society, and pointed out that medicine, law, and engineering have much more prestige. To say that teachers are not respected because they make less money than doctors, lawyers, and engineers is to focus only on the symptoms. The real cause of the problem, Piaget said, is that education is a profession that is not based on a solid body of knowledge. Medicine is based on a vast amount of scientific research and theory. Law is likewise based on a highly explicit and systematized body of knowledge, and attempts are constantly and rigorously made in law to avoid contradictions. Engineering, too, is based on a vast amount of scientific research and theory. Education, by contrast, is in a prescientific or early scientific stage that, I think, resembles Aristotle and Ptolemy's astronomy. Aristotle and Ptolemy rejected the view that the sun might be the center of our system, and upheld the common-sense theory that the sun and other planets revolved around the earth. Because education does not have a scientific base, educators jump on

*A talk given at a Celebration in Honor of Jean Piaget, sponsored by the Erikson Institute of Loyola University and The University of Chicago Press, Chicago, December 5, 1980.

bandwagons when new fads appear, and they change ~~back and forth~~ their beliefs with the public as the old pendulum swings. The recent "back to the basics" movement is one more example of this sad state of the profession.

Education is a profession that developed over the centuries by personal opinions called philosophies and by trial and error and by tradition, to meet certain practical needs. To educate the young generation of their society, teachers have used their best common sense. But a profession cannot develop on the basis of common sense alone. We now have many situations in which one person's common sense is the diametric opposite of another person's common sense, and disagreement ranges from what to teach at what age to everything else, such as the desirability of behavioral objectives and testing programs. Just as agriculture and medicine advanced with scientific research and theory, education can go forward only by raising fundamental questions once again and getting scientific answers to these questions. The two fundamental questions are: "How do children acquire knowledge?" and "How do they learn moral values?"

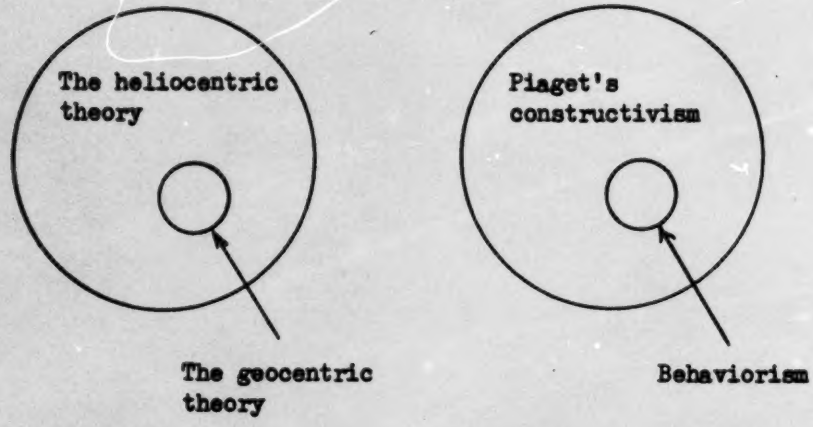
I stated earlier that education is in a prescientific or early scientific stage. The reason for this statement is that some educators have tried to base their practice on various scientific theories such as behaviorism. Essentially, behaviorism views "learning" as the internalization of knowledge and moral values from the environment, and explains "learning" by reinforcement. Its implication for educators is that if we want children to become able to do something, we have to reinforce correct answers with reward and repetition, and sequence objectives to maximize success.

But there are many counterexamples that make even the layman skeptical of behaviorism. For example, if Johnny cries and the teacher holds him, this comforting does not reinforce Johnny's crying. Instead of learning to cry more by

having this behavior reinforced, Johnny gets over his upset and goes on to something else that is more interesting than crying. Children's learning to walk and talk also disproves behaviorism. Children do not need reinforcement from adults to learn how to walk and talk, nor do they need a sequence of objectives that maximizes success. Encouragement helps, but if toddlers fall down, they get up and try to walk again even if they are not encouraged by adults. Besides, failure is necessary to learn how to walk. Toddlers need to know how they fall if they are to figure out how to avoid falling. Learning to talk also comes out of children's initiative and errors. No programmer would teach children to say "My foots hurt," "I brang my lunch today," or "I thinked it in my head." But teachers know that children go through these errors. Children make these errors <u>because</u> they are intelligent and can think, and I would worry about a child who did not make these errors. Some children even surprise us by learning to read, without any teaching or reinforcement on the part of the parents or teachers at the day care center. In my research on first-grade arithmetic, I found out a month ago that, without any teaching or reinforcement on the teacher's part, almost all the children in the class knew by heart the sums of 2+2, 5+5, and 3+3. More than half of the class also knew the sum of 4+4. The children played dice games and card games, and they learned these sums by heart without any lesson, worksheet, drill, or reinforcement.

These examples contradicting behaviorism illustrate the process by which all sciences develop. In astronomy "the" scientific truth before the publication of Copernicus's heliocentric theory in 1543 was Ptolemy's geocentric theory. But many astronomers were bothered by counterexamples. The calendar of the time was sometimes off, and predictions about planets' positions were constantly wrong. Grappling with these contradictions, Copernicus ended up by proposing a theory in diametric opposition to the common-sense theory of his day. The scientists of his time reacted by laughing him off the stage. But today, only 400 years later, no one doubts

the truth of the heliocentric theory.



The relationship between behaviorism and Piaget's theory is analoguous to the relationship between the geocentric theory and Copernicus's heliocentric theory. Behaviorism and the geocentric theory both grew out of common sense, and Piaget and Copernicus both revolutionized common sense. Both invented their theories by trying to overcome the contradictions presented by the prevailing view. In each domain, the later theory stated the opposite of the earlier theory, but the earlier theory was not eliminated. The earlier theory became a particular case within the new theory. In the weather forecast, for example, we still hear of the time the sun rises and sets. Within the limited perspective of the earth, it is still true that the sun rises every morning, but from a broader perspective, it is no longer true that the sun goes around the earth. Behaviorism is likewise still true within certain limits. For example, if we want to teach toddlers not to go out into the street, behaviorism is clearly still true and highly useful. If we want to teach children to memorize the multiplication tables, likewise, behaviorism is still as true as the sunrise every morning. But, within the broader perspective of children's acquisition of knowledge and moral values, it is no longer true that these are learned by reinforcement and well-sequenced objectives.

Let us return to the two fundamental questions educators must ask: "How do children acquire knowledge?" and "How do they learn moral values?" Piaget studied these questions scientifically. He concluded that both knowledge and morality are constructed from within by each child in interaction with the environment, rather than being learned directly by internalization from it.

An example might help to understand the child's construction of knowledge from within. Once, when I came face to face with a 5-year-old black girl in a day care center, the child greeted me by saying, "Hi, Chinese." I responded by saying that I was Japanese and not Chinese, and asked her "What are you?" The girl said she was black, whereupon I asked, "Are you an American?" She said "yes," and I told her that I, too, was an American. The girl was amazed and asked, "Is that because you are black?" We see the constructive process in this example. For this child, all blacks were apparently American, and all Americans were conversely black. When I told her I was an American, she reasoned that I had to be black if I was an American. The construction of knowledge is such a complicated business, and anybody who is around children can see that knowledge is not acquired directly by internalization from the environment.

The second question educators must ask is how moral values are learned by children. Piaget concluded in 1932, almost 50 years ago, that moral values and rules, too, are constructed from within by each individual rather than being learned directly by internalization from the environment. Piaget made a distinction between the morality of autonomy and the morality of heteronomy. Autonomy means "being governed by oneself," while heteronomy means "being governed by somebody else." Piaget asked many children whether it was worse to tell a lie to a grownup or to another child. An example of the morality of heteronomy is the 6-year-old who answered that it was worse to lie to a grownup. When Piaget asked why, the

child replied, "Because adults can tell it isn't true." An example of the morality of autonomy is the 12-year-old who answered, "Sometimes you almost have to tell lies to a grownup, but it's rotten to do it to another fellow." Autonomous people have their own convictions about why it is bad to tell lies.

If we want children to become heteronomous adults, the best way is to use behavioristic principles, that is, reward and/or punishment. Behaviorism (the small circle in the figure) is a very limited theory that can explain heteronomy and aspects of our behavior that we share with animals, such as motor skills and certain habits. If we want children to become autonomous adults, we need a broader, more powerful theory that goes beyond reward and punishment (the large circle in the figure).

Teachers who want to foster the morality of autonomy must think of ways that encourage children to construct their own moral values for themselves. If a child tells a lie, for example, the teacher must avoid punishing him, look him straight in the eye instead, with great affection and skepticism, and say, "I really can't believe what you are saying because . . ." This communication of a point of view makes the child think about what he has to do if he wants to be believed and trusted. If there is a good human relationship between the child and the teacher, the child may, over a period of time, construct for himself the value of honesty. Adults who have constructed their own conviction about the desirability of honesty can resist the temptations of the reward system. They become like Elliot Richardson, who was the only one on Nixon's cabinet in the Watergate Cover-Up Affair who refused to tell lies and handed in his resignation. Autonomy is not only more moral than heteronomy; it is also more intelligent than heteronomy. Autonomy, in other words, is indissociably moral, intellectual, social, and emotional in nature.

Most educators and parents are still at a prescientific stage of holding the common-sense belief that the way to raise children to become moral is by being

strict. The detention hall, having to write 50 times "I will not talk in class," grades, gold stars, and citizenship awards are examples of the reward and punishment schools still use to get children to be "good." The behavioral objectives and tests that are imposed on teachers in the "back to the basics" movement are based on a scientific theory, but a theory that was surpassed decades ago, when Piaget published Judgment and Reasoning in the Child in 1924, The Child's Conception of the World in 1926, The Child's Conception of Physical Causality in 1927, The Moral Judgment of the Child in 1932, The Origins of Intelligence in 1936, The Construction of Reality in 1937, and many other volumes that are too numerous to mention. I am not against the 3 Rs. I am, in fact, all for them. But reading, writing, and arithmetic must be taught in ways that fit the way children honestly think, and not with behavioral objectives that are foreign to the way they learn.

Science never goes back to an earlier stage. Once we believe in the heliocentric theory, we cannot go back to the old geocentric theory. Once we understand quantum physics, likewise, we cannot go back to the physics of Aristotle, Galileo, and Newton. Once we understand non-Euclidean geometry, similarly, we cannot go back to the limited view of Euclid's geometry. I have seen many behaviorists, associationists, and empiricists change over to Piaget's theory as I did, but I have never heard of a Piagetian who became a behaviorist. When you hear of "back to the basics," therefore, you know that a profession that can shamelessly go back to what did not work before is obviously not based on scientific knowledge. Science only goes forward and always builds on what is already known. If educators understood learning and development scientifically, the profession would go forward and not backward any more.

I have insisted so far that education must become more scientific. But I am not saying that education must become a pure science. Piaget said that education is and must remain an art, just as good medicine still is and must remain an art. Doctors must take into account the possibility of various side effects, as well as the patient's fears, dependency needs, and need for independence. Medicine is

thus an art involving guesswork and human factors, but it is an art based on a vast amount of scientific knowledge. Education must likewise become an art that is based on scientific research and precise theoretical links.

I am not saying that medicine is fully developed or that doctors always know what they are doing. What I am saying is that educators must learn from the rigor of more advanced professions. Piaget left behind a towering theory about how each individual and the entire human race construct knowledge and moral values. Every educator must wake up to this theory and compare it for himself with the scientific merits of all the other theories that explain how children acquire knowledge and become responsible citizens. Piaget's theory may then become widely accepted before the end of this century, just as Copernicus's theory was in the end accepted as being more adequate than the geocentric theory. Piaget left for us the tools with which to move forward. It is now up to us to make use of these tools.

References

J. Piaget. Judgment and Reasoning in the Child. New York: Harcour & Brace, 1926 (first published in 1924).

J. Piaget. The Child's Conception of the World. New York: Harcourt & Brace, 1929 (first published in 1926).

J. Piaget. The Child's Conception of Physical Causality. Totowa, New Jersey: Littlefield, Adams & Co., 1966 (first published in 1927).

J. Piaget. The Moral Judgment of the Child. New York: Harcourt, 1932.

J. Piaget. The Origins of Intelligence in Children. New York: International University Press, 1952 (first published in 1936).

J. Piaget. The Construction of Reality in the Child. New York: Basic Books, 1954 (first published in 1937).

J. Piaget. Science of Education and the Psychology of the Child. New York: Viking, 1972 (first published in 1965).